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10/613,830	07/03/2003	Roberto Rambaldi	SGSTP009D1	6799

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EXAMINER	
HANNETT, JAMES M	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/613,830	RAMBALDI ET AL.	
	Examiner	Art Unit	
	James M. Hannett	2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 May 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *17-22 and 38-50* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *17-22 and 38-50* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *7/3/2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date: _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 5/29/2007 have been fully considered but they are not persuasive. The applicant argues that Swetser does not teach resetting any pixel and only describes setting a pixel to a reference value. The examiner asserts that the process of setting a pixel to a reference value is equivalent to resetting a pixel, since a process to change the value of a pixel to a known reference value is a resetting operation to reset the pixel to the reference value.

The applicant argues that Swetser does not teach designating a pixel as either partially or completely corrupt and only describes an operable pixel or a corrupt pixel. The examiner disagrees with the applicant and asserts that When an image sensor for a camera is created it is desired that all the pixels in the image sensor will have the same sensitivity characteristics. This means that when exposed to an equal amount of light it is desired that every pixel will output an equal amount of charge. This is necessary in order to capture a proper image. However, this is not what happens because it is impossible to manufacture all pixels with the same sensitivity characteristics. Typically, a camera will be tested when it is manufactured and the sensitivity of each pixel is measured and a gain correction is applied to each pixel in order to make the outputs of all the pixels equal when exposed to the same amount of light. Sweetser improves upon this by measuring the sensitivity characteristics of each pixel periodically since pixel sensitivity deteriorates over time (Sweetser Column 9, Lines 30-42). Sweetser measures the outputs of all the pixels after taking a test image and applies a new gain to each pixel in order to maintain a uniform output from every pixel. However, occasionally pixels are inoperative and are unable to

output any charge or the pixels sensitivity characteristics are very high or low and the normal gain compensation to the pixels will not correct the defect (Sweetser Column 1, Lines 60-66). Sweetser compensates for this by detecting when the sensitivity characteristics of the pixels exceed a threshold and flags the pixels as inoperative and applies a pixel substitution instead of a gain correction in order to more properly represent the pixels.

The examiner has viewed the pixels that need to be gain compensated as the partially corrupt pixels, since they deviate from their desired sensitivities and need to be corrected. Furthermore, since their sensitivities will deteriorate over time, this is viewed as further corruption of the pixel. Furthermore, a pixel that has sensitivity characteristics that have deteriorated so much that they are above the set threshold value will be unable to be corrected with a gain correction and will need to be marked as defective and be replaced. The examiner has viewed the pixels that are above this threshold as being fully corrupt since they are unable to capture light that can be gain corrected and output. Therefore, the examiner asserts that Sweetser teaches both a partial and full corruption.

The saturation level of a pixel is the limit to the amount of charge that a pixel can store before having the charge in the pixel overflow into adjacent pixels and is synonymous to a pixel being full. Furthermore, when a pixels sensitivity characteristics are very high and very low as taught by Sweetser, they will saturate (fill up) very quickly or very slowly. Sweetser did not teach flagging the pixels based on if a pixel was saturated and instead performed this correction based on sensitivity level (and equated to a level of corruption as discussed above).

The examiner asserts that when a pixel in Swetser is contains charge below the threshold value; the pixel is partially full and therefore, partially saturated. Furthermore, when a pixel is

above the threshold and is viewed as fully corrupt, the pixel is full of charge and therefore, fully saturated. The Examiner has taken official notice that this was well known in the art and that determining the sensitivity characteristics of a pixel (corruption level) based on a detection if the pixels are partially or fully saturated (partially full and full) was commonly known in the art at the time of the invention.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1: Claims 17-22, 38, 39 and 43-48 are rejected under 35 U.S.C. 102(b) as being anticipated by USPN 5,532,484 Sweetser et al.

2: As for Claim 17, Sweetser et al teaches on Column 4, Lines 45-64 and depicts in Figures (1, 3 and 4) a method of testing a selected pixel to determine whether it is faulty. Sweetser et al teaches in Figure 3 and on Column 8, Lines 12-61 the structure for a image sensor in which the pixels (100) are initially charged to a bias voltage using voltage sources (116) This initial charging to the bias voltage is a resetting process to reset the pixels to an appropriate initial voltage. Therefore, Sweetser et al teaches electronically resetting the selected pixel (100) to a defined charge. Sweetser et al further teaches on Column 8, Lines 55-58 that the signals on the pixels (100) are read out of the image sensor and sent to the video processor (24). Therefore, Sweetser et al teaches reading the selected pixels (100) output. Sweetser et al further teaches on Column 10, Lines 6-51 that after the pixels are charged to the appropriate charge, a detection and

substitution module compares the read output signal (32) to a reference value (162). Therefore, Sweetser et al teaches comparing the selected pixels output (32) to an expected value (reference value 162) based upon the defined charge provided to the selected pixel (the read out charge is based upon the charge input to the pixels). Sweetser et al teaches on Column 10, Lines 39-43 if the selected pixels output deviates from the expected value (reference value 162) by more than a defined threshold, then the pixel is characterized as defective. Therefore, the examiner views a pixel exceeding the threshold as being completely corrupted and a pixels that does not exceed the threshold as being partially corrupted.

3: In regards to Claim 18, Sweetser et al teaches on Column 2, Lines 13-28 and on Column 9, Lines 30-43 that if a pixels is designated as defective, the pixels value is substituted with a value equivalent to a combination of signals from adjacent pixels. And that if the pixel is not deemed defective, the value of the pixel is adjusted using the gain normalizer (154) to adjust the signal according to the predetermined sensitivity characteristics of each pixel. Therefore, Sweetser et al teaches If the selected pixel is partially corrupted pixel (not flagged as defective), it is to be imaged by a first technique (Adjusted using gain normalizer 156) during readout and if the selected pixel is completely corrupted (defective), it is to be imaged by a second technique (signal replacement) during readout.

4: As for Claim 19, Sweetser et al teaches on Column 10, Lines 36-51 determining whether the selected pixel is partially (below threshold and only requires gain adjustment) or completely corrupted (defective and requires pixel substitution) comprises determining how far the selected pixels output deviates (difference between output signal and reference signal) from the expected value (reference value), such that if the selected pixel's output deviates by more than a defined

amount (exceeding the threshold) from the expected value (reference signal 162) deeming the selected pixel to be completely corrupted (defective) and if the selected pixel's output deviates by no more than a defined amount (does not exceed the threshold) from the expected value (162) deeming the selected pixel to be partially corrupt (only requiring gain adjustment).

5: In regards to Claim 20, Sweetser et al teaches on Column 2, Lines 13-28 and on Column 9, Lines 30-43 that if a pixels is designated as defective, the pixels value is substituted with a value equivalent to a combination of signals from adjacent pixels. And that if the pixel is not deemed defective, the value of the pixel is adjusted using the gain normalizer (154) to adjust the signal according to the predetermined sensitivity characteristics of each pixel. Therefore, Sweetser et al teaches the first correction technique comprises adjusting the output of the selected pixel (gain adjustment) and wherein the second correction technique comprises replacing the output of the selected pixel with an average of the outputs of pixels located about the selected pixel. (Column 5, Lines 45-50)

6: As for Claim 21, Sweetser et al teaches on Column 6, Lines 11-22 if the selected pixel is found to be faulty, storing its location in memory.

7: In regards to Claim 22, Sweetser et al teaches on Column 4, Lines 45-65 exposing the pixel to a defined amount of test radiation, after electronically resetting the selected pixel and prior to reading the selected pixels output.

8: As for Claim 38, Sweetser et al teaches on Column 4, Lines 45-64 and depicts in Figures (1, 3 and 4) An apparatus for characterizing a pixel. Sweetser et al teaches in Figure 3 and on Column 8, Lines 12-61 the structure for a image sensor in which the pixels (100) are initially charged to a bias voltage using voltage sources (116) This initial charging to the bias voltage is a

resetting process to reset the pixels to an appropriate initial voltage. Therefore, Sweetser et al teaches setting a pixel voltage to a reset voltage, wherein the reset voltage corresponds to the state of the pixel when the pixel has been exposed to substantially no radiation (Column 8, Lines 51-57). Sweetser et al teaches a method of testing a selected pixel to determine whether it is faulty. electronically resetting the selected pixel (100) to a defined charge. Sweetser et al further teaches on Column 8, Lines 55-58 that the signals on the pixels (100) are read out of the image sensor and sent to the video processor (24). Therefore, Sweetser et al teaches reading the selected pixels (100) output. Sweetser et al further teaches on Column 10, Lines 6-51 that after the pixels are charged to the appropriate charge, a detection and substitution module compares the read output signal (32) to a reference value (162). Therefore, Sweetser et al teaches comparing the selected pixels output (32) to an expected value (reference value 162) based upon the defined charge provided to the selected pixel (the read out charge is based upon the charge input to the pixels). Sweetser et al teaches on Column 10, Lines 39-43 if the selected pixels output deviates from the expected value (reference value 162) by more than a defined threshold, then the pixel is characterized as defective. Therefore, the examiner views a pixel exceeding the threshold as being completely corrupted and a pixels that does not exceed the threshold as being partially corrupted.

9: In regards to Claim 39, Sweetser et al teaches on Column 2, Lines 13-28 and on Column 9, Lines 30-43 that if a pixels is designated as defective, the pixels value is substituted with a value equivalent to a combination of signals from adjacent pixels. And that if the pixel is not deemed defective, the value of the pixel is adjusted using the gain normalizer (154) to adjust the signal according to the predetermined sensitivity characteristics of each pixel. Therefore,

Sweetser et al teaches the type of pixel correction mechanism applied is based on whether the pixel is partially or completely corrupted (defective or not defective).

10: As for Claim 43, Sweetser et al teaches on Column 2, Lines 13-28 and on Column 9, Lines 30-43 that if a pixels is designated as defective, the pixels value is substituted with a value equivalent to a combination of signals from adjacent pixels. And that if the pixel is not deemed defective, the value of the pixel is adjusted using the gain normalizer (154) to adjust the signal according to the predetermined sensitivity characteristics of each pixel. Therefore, Sweetser et al teaches if the pixel is partially corrupted (is not defective and only requires gain adjustment), it is to be imaged by a first technique during readout (gain adjustment) and if the selected pixel is completely corrupted (defective), it is to be imaged by a second technique during readout (signal replacement), wherein the first and second techniques are different.

11: In regards to Claim 44, Sweetser et al teaches on Column 2, Lines 13-28 and on Column 9, Lines 30-43 that if a pixels is designated as defective, the pixels value is substituted with a value equivalent to a combination of signals from adjacent pixels. This is viewed by the examiner as being equivalent to pixel masking.

12: As for Claim 45, Sweetser et al teaches on Column 2, Lines 13-28 and on Column 9, Lines 30-43 that if the pixel is not deemed defective (first technique), the value of the pixel is adjusted using the gain normalizer (154) to adjust the signal according to the predetermined sensitivity characteristics of each pixel. Therefore, the first technique (gain normalization) comprises adjusting the output of the pixel by a fixed percentage. It is inherent that an adjustment of the pixel value by any value will adjust the value by a fixed percentage.

13: In regards to Claim 46, Sweetser et al teaches on Column 6, Lines 11-22 storing the location and the characterization of the pixel .

14: As for Claim 47, Sweetser et al teaches on Column 4, Lines 45-64 and depicts in Figures (1, 3 and 4) An apparatus for characterizing a pixel. Sweetser et al teaches in Figure 3 and on Column 8, Lines 12-61 the structure for a image sensor in which the pixels (100) are initially charged to a bias voltage using voltage sources (116) This initial charging to the bias voltage is a resetting process to reset the pixels to an appropriate initial voltage. Therefore, Sweetser et al teaches setting a pixel voltage to a reset voltage, wherein the reset voltage corresponds to the state of the pixel when the pixel has been exposed to substantially no radiation (Column 8, Lines 51-57). Sweetser et al teaches a method of testing a selected pixel to determine whether it is faulty. electronically resetting the selected pixel (100) to a defined charge. Sweetser et al further teaches on Column 8, Lines 55-58 that the signals on the pixels (100) are read out of the image sensor and sent to the video processor (24). Therefore, Sweetser et al teaches reading the selected pixels (100) output. Sweetser et al further teaches on Column 10, Lines 6-51 that after the pixels are charged to the appropriate charge, a detection and substitution module compares the read output signal (32) to a reference value (162). Therefore, Sweetser et al teaches comparing the selected pixels output (32) to an expected value (reference value 162) based upon the defined charge provided to the selected pixel (the read out charge is based upon the charge input to the pixels). Sweetser et al teaches on Column 10, Lines 39-43 if the selected pixels output deviates from the expected value (reference value 162) by more than a defined threshold, then the pixel is characterized as defective. Therefore, the examiner views a pixel exceeding the threshold as

being completely corrupted and a pixels that does not exceed the threshold as being partially corrupted.

15: In regards to Claim 48, Sweetser et al teaches on Column 2, Lines 13-28 and on Column 9, Lines 30-43 that if a pixels is designated as defective, the pixels value is substituted with a value equivalent to a combination of signals from adjacent pixels. And that if the pixel is not deemed defective, the value of the pixel is adjusted using the gain normalizer (154) to adjust the signal according to the predetermined sensitivity characteristics of each pixel. Therefore, Sweetser et al teaches if the pixel is partially corrupted (is not defective and only requires gain adjustment), it is to be imaged by a first technique during readout (gain adjustment) and if the selected pixel is completely corrupted (defective), it is to be imaged by a second technique during readout (signal replacement), wherein the first and second techniques are different.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

16: Claims 40-42, 49 and 50 rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 5,532,484 Sweetser et al

17: As for Claims 40-42, Sweetser et al teaches on Column 10, Lines 36-51 and on Column 9, Lines 55-67 determining whether the selected pixel is partially (below threshold and only requires gain adjustment) or completely corrupted (defective and requires pixel substitution) comprises determining how far the selected pixels output deviates (difference between output

signal and reference signal) from the expected value (reference value), such that if the selected pixel's output deviates by more than a defined amount (exceeding the threshold) from the expected value (reference signal 162) deeming the selected pixel to be completely corrupted (defective) and if the selected pixel's output deviates by no more than a defined amount (does not exceed the threshold) from the expected value (162) deeming the selected pixel to be partially corrupt (only requiring gain adjustment). Therefore, Sweetser et al teaches the type of pixel correction mechanism applied is based on whether the difference between the output pixel value and the reference value exceeds a threshold. Furthermore, Sweetser et al teaches on Column 3, Lines 3-8 that the threshold value may represent the expected signal variation in neighboring pixels viewing a high contrast scene as limited by the thermal imaging systems modulation transfer function and further states on Column 4, Lines 65-67 and on Column 5, Lines 1-12 that defective pixels are pixels that are totally inoperative or have sensitivity characteristics that are undesirably high or low. However, Sweetser et al does not explicitly say that the threshold value is set to a value that will indicate that a defective pixel is saturated.

However, Official Notice is taken that it was well known in the art at the time the invention was made that defective pixels that are totally inoperative or have sensitivity characteristics that are undesirably high will saturate very quickly and that it was common practice to designate saturated pixels in an image as defective.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to set the threshold value of Sweetser et al to a value that represents if a pixel is saturated in order to eliminate all the saturated pixels from the image and therefore, improve image quality.

18: In regards to Claims 49 and 50, Sweetser et al teaches on Column 10, Lines 36-51 determining whether the selected pixel is partially (below threshold and only requires gain adjustment) or completely corrupted (defective and requires pixel substitution) comprises determining how far the selected pixels output deviates (difference between output signal and reference signal) from the expected value (reference value), such that if the selected pixel's output deviates by more than a defined amount (exceeding the threshold) from the expected value (reference signal 162) deeming the selected pixel to be completely corrupted (defective) and if the selected pixel's output deviates by no more than a defined amount (does not exceed the threshold) from the expected value (162) deeming the selected pixel to be partially corrupt (only requiring gain adjustment). Therefore, Sweetser et al teaches the type of pixel correction mechanism applied is based on whether the difference between the output pixel value and the reference value exceeds a threshold. Furthermore, Sweetser et al teaches on Column 3, Lines 3-8 that the threshold value may represent the expected signal variation in neighboring pixels viewing a high contrast scene as limited by the thermal imaging systems modulation transfer function and further states on Column 4, Lines 65-67 and on Column 5, Lines 1-12 that defective pixels are pixels that are totally inoperative or have sensitivity characteristics that are undesirably high or low. However, Sweetser et al does not explicitly say that the threshold value is set to a value that will indicate that a defective pixel is saturated.

However, Official Notice is taken that it was well known in the art at the time the invention was made that defective pixels that are totally inoperative or have sensitivity characteristics that are undesirably high will saturate very quickly and that it was common practice to designate saturated pixels in an image as defective.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to set the threshold value of Sweetser et al to a value that represents if a pixel is saturated in order to eliminate all the saturated pixels from the image and therefore, improve image quality.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James M. Hannett whose telephone number is 571-272-7309. The examiner can normally be reached on 8:00 am to 5:00 pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lin Ye can be reached on 571-272-7372. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

James M. Hannett
Examiner
Art Unit 2622

JMH
August 1, 2007

LIN YE
SPE. ART UNIT 2622